

Eurhynchium strigosum so far collected in Vermont is var. *robustum* Roell.

Bryhnia graminicolor. Willoughby, Dr. Kennedy. Newfane.

Porotrichum Alleghaniense. Wet overhanging rocks, Newfane.

Rhynchostegium serrulatum. On soil, Higbee swamp, Burlington. Newfane.

Entodon repens. Newfane.

Pylaisia velutina. On trees, Stowe.

Homalia Jamesii. Not infrequent on cool shaded rocks in moist situations.

Leucodon sciuroides. Not uncommon.

BOYS' HIGH SCHOOL, Brooklyn, New York.

SEED DISPERSAL OF *VIOLA ROTUNDIFOLIA*.

R. G. LEAVITT.

AT maturity the capsule of the violet slowly opens. Each of the three boat-shaped valves holds several smooth, hard, oval seeds. As the fruit dries and the sides of the valves draw together more and more strongly, the seeds are squeezed with increasing force. At length they escape from the pressure and are at the same instant thrown to a distance. The end seeds in each valve fly out first, according to Kerner, and the rest follow in orderly succession at intervals. The distance attained by the seed-missiles of this catapult fruit is given by the authority mentioned as a little over three feet in the case of *Viola canina*, for which alone figures are given. We have at present in the garden of native plants at North Easton a violet, *V. rotundifolia*, which puts Kerner's species to shame in this matter of seed dispersal. Young plants from the spring crop of self-sown seeds have now grown to such a size that they may be definitely recognized by the round leaf; and they form a living chart of the points to which the seeds were thrown. The parents occupy a pocket or small bed marked off by a circle of stones. In an adjoining pocket, within one or two feet of the home plantation, the offspring have come up freely. At a distance of a little more than 5 feet there are three seedlings. And there is one young plant 9 feet,

1 inch from the nearest adult of the species. It happens that all the seedlings are up hill from the original bed, so that water could not have furnished transportation. The arrangement of separating the pockets by lines of stones and the peculiar position of the farthest seedlings with reference to stones, exclude the garden rake as the dispersing agent. And finally, there are, within several miles of the spot, no members of the species except those in the pocket mentioned, so that the question of source is definitely settled. It seems clear, then, that *Viola rotundifolia* has the power of casting its seeds to a distance certainly of five, and very probably of nine, feet.

The process of expulsion may be watched if the ripe, unopened fruits are separated into their parts and laid on a table where they will dry. Results will follow within a relatively short time, within a few minutes if the capsules are already well prepared. In *V. rotundifolia* the middle of the three rows of seeds in each valve goes first. Some of the seeds are merely pushed out. Many are thrown less than a foot. Those that are caught in the right way between the jaws of the machine, or have the strongest attachments to the placenta fly the farthest. The intensity of the reaction is dependent largely upon the tenacity of the seed-stalk, which parts and releases the projectile only after the lateral, or oblique, pressure has become considerable.

The round-leaved violet is one of the earliest to bloom. After anthesis prostrate peduncles are put forth until past midsummer, bearing cleistogamous flowers. The capsules lie on the ground, hidden away under the leaves and often more or less buried beneath surface accumulations. When the performances of the earlier fruits had been noted, the question was naturally suggested whether these late pods have the same powers of projection, or whether owing to lack of use, this power, like the sight of cave fishes, has been lost. The answer was given at once, for all stages of the seed vessel from imperfect ripeness to barren age were found together. That answer is this. As the fruit approaches maturity the peduncle bends about midway. The capsule is withdrawn from its seclusion and elevated to a position about two inches above the earth, from which level the valvular catapults may work with advantage. The seeds are then expelled as in other cases.

THE AMES BOTANICAL LABORATORY, North Easton, Massachusetts.